



California Regional Water Quality Control Board

Central Coast Region

Alan C. Lloyd, PhD.
Secretary for
Environmental
Protection

Internet Address: <http://www.waterboards.ca.gov/centralcoast>
895 Aerovista Place, Suite 101, San Luis Obispo, California 93401
Phone (805) 549-3147 • FAX (805) 543-0397



Arnold
Schwarzenegger
Governor

May 6, 2005

Mr. Richard W. McClure
Olin Corporation
Environmental Remediation Group
PO Box 248
Charleston, TN 37310-0248

Dear Mr. McClure:

**SLIC: LLAGAS SUBBASIN MONITORING PLAN, 425 TENNANT AVENUE
FACILITY, MORGAN HILL, SANTA CLARA COUNTY**

Regional Water Board Staff has reviewed the *Llagas Subbasin Monitoring Plan* (Monitoring Plan), dated April 11, 2005. The Monitoring Plan was submitted to comply with Ordering Paragraph A of Cleanup or Abatement Order R3-2005-0014. Ordering Paragraph A requires Olin Corporation and Standard Fusee Corporation (collectively referred to as "Dischargers") to propose a monitoring plan to completely characterize and monitor the lateral and vertical extent of perchlorate in aquifer zones south of the Olin site. Olin is required to submit the Monitoring Plan to address the following objectives: characterization of the lateral and vertical extent of perchlorate pollution in all identifiable aquifer zones, determination of plume migration status, determination of aquifer zone specific perchlorate concentration data, and provide data to advance and improve the offsite hydrogeologic conceptual model. In order to address these objective, Olin is required to include the following plan elements:

1. Recommendations for locations of new and existing offsite monitoring wells to determine the lateral and vertical extent of perchlorate pollution.
2. Recommendations for locations of new monitoring wells or existing supply wells to act as sentry wells for the City of Gilroy and other high volume water users.
3. Recommendations for and identification of water supply wells that are proposed for inclusion in the Llagas Subbasin Monitoring Plan. If the Dischargers choose to include water supply wells, those wells shall be shown to be equivalent to properly sited and constructed monitoring wells.
4. Recommendations for a regional and local aquifer specific groundwater elevation-monitoring network to determine groundwater flow patterns.
5. Recommendations for a sampling and analysis plan that establishes standard sampling procedures.
6. Recommendations for a statistical method to determine if perchlorate concentrations are increasing, decreasing or static. The statistical method shall be applied to all monitoring wells.
7. Recommendations for prioritizing the investigation and characterization of plume areas to aid in the earliest possible determination of plume migration status.

California Environmental Protection Agency



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The Monitoring Plan appears to represent a reasonable starting point for Llagas Subbasin characterization and monitoring. The Monitoring Plan includes recommendations to install clustered monitoring wells at eight locations, recommendations for sentry wells for the City of Gilroy, and a Sampling and Analysis Plan. In addition, Olin has made recommendations to include supply wells in the proposed monitoring network and validation criteria for those wells.

After careful review, Regional Board staff has determined that the proposed monitoring plan does not adequately address the objectives and elements described above. We have prepared our comments, outlined below, for Olin to consider and address. Olin shall provide a response to Regional Water Board comments no later than **May 27, 2005**. We have not yet received comments from interested parties such as the Santa Clara Valley Water District, Cities of Gilroy and Morgan Hill, or the Perchlorate Community Advisory Group. We will pass those comments on to Olin soon after we receive them. Please be aware that we may require Olin to address some or all of the interested parties comments where appropriate.

The Monitoring Report contains recommendations for the installation of clustered monitoring wells at eight locations south of your site. We request that you proceed with the installation and development of the eight clustered monitoring wells. Regional Board staff believes that additional cluster wells are needed to adequately delineate the lateral and vertical extent of perchlorate. In addition, to the proposed clustered monitoring wells, supply well characterization shall also proceed. The Monitoring Well Installation and Characterization Work Plan is due June 3, 2005, and will contain Olin's detailed installation and characterization plans. Comments related to monitoring well installation and supply well characterization are included in number 3, below. We recommend that you review those comments carefully prior to clustered monitoring well installation.

Ordering Paragraph A, Elements:

1. Recommendations for locations of new and existing offsite monitoring wells to determine the lateral and vertical extent of perchlorate pollution.

Olin has done an admirable job of developing a hydrogeologic model to guide the characterization of the lateral and vertical extent of perchlorate in the Llagas Subbasin. As we understand, your consultant MACTEC has reviewed several hundred-supply well logs and has developed a hydrogeologic model to better understand the Llagas groundwater Basin. MACTEC has produced a fence diagram and cross sections, based on available driller logs, to aid in understanding where perchlorate is and is not located. Olin believes based on the fence diagram that an intermediate zone sequence is present beneath the site and can be continuously traced south to the Pacheco Pass Highway. The Monitoring Report concludes that this sequence is the main perchlorate-bearing zone. Olin supports this conclusion by assigning perchlorate values to aquifer zones based on well screen locations. However, some of the wells shown on the fence diagram have multiple screens, are located in upper aquifer zones or have no well logs associated with them. MACTEC has also constructed cross sections (running east west) to detail the edges of the basin and included a regional groundwater elevation map of wells stretching from Morgan Hill to Gilroy.



Olin's monitoring network appears to have been proposed based on the occurrence of perchlorate at or above the Department of Health Services (DHS) 6 part per billion Notification Level. The report refers to the DHS Action Level, which has been replaced with Notification Level. We do not believe that it is appropriate to limit the characterization of the lateral and vertical extent of perchlorate contamination to the DHS Notification level. The DHS Notification Level applies to municipal drinking water systems and has no bearing on groundwater contamination characterization efforts. We do not believe that the currently proposed system can delineate the lateral and vertical extent of Olin's perchlorate contamination. The monitoring system shall define the full extent of contamination in the Llagas Subbasin.

Proposed Dedicated Monitoring Wells:

The proposed monitoring well locations are acceptable since they appear to be located near the centerline of the valley and plume, where perchlorate is located. Installation of Wells MW-16, 17, 21, 26, 29, 35, 40, and 44 shall proceed according to the requirements of CAO R3-2005-0014.

We believe the use of Monitoring wells MW-17 and MW-16 to monitor the mass flux of perchlorate is a good approach (referred to a gate monitoring approach hereafter). These wells will be used to measure the mass flux of perchlorate in the vicinity of the site. We believe the gate monitoring approach should be utilized at the other cross sections noted in the plan. However we believe that additional dedicated monitoring wells will be needed to delineate the lateral and vertical extent of perchlorate.

The monitoring plan does not propose any other dedicated monitoring wells to characterize perchlorate occurrence at the plumes northeast or southwest areas, or at the plume's southern leading edge. It appears that Olin has not made recommendations for dedicated monitoring wells in these areas since there are existing supply wells in these areas which have detections at or below the 6 ppb Notification Level. As discussed earlier, the characterization of the plume's lateral and vertical extent should be based on the occurrence of perchlorate and not the occurrence of perchlorate at the Notification level. Regional Board staff believes that the areas to the northeast and southwest and southern leading edge should have dedicated monitoring wells. In addition, these wells should be constructed so that the depth of perchlorate contamination can be establish and vertical gradients monitored. Monitoring wells should be capable of monitoring aquifer intervals just below where contamination is found or believed to occur. This will allow monitoring of vertical migration throughout the affected area.

Areas to the east and west of the proposed Dedicated Monitoring wells:

We understand Olin is proposing to rely on existing supply wells to monitor the plume's lateral extents to the east and west of the dedicated monitoring wells. As stated above, it appears that Olin is limiting the lateral and vertical characterization of perchlorate to the occurrence of the 6 ppb Notification Level. As stated, it is not acceptable to limit the plume's characterization and delineation to the 6 ppb Notification level. An indication that this is unacceptable and that additional dedicated monitoring wells are needed is shown on South of Church Avenue Cross Section. The area to the Northeast of well 10204E18B017 does not appear to be monitored in the lower zone where the perchlorate detection has been assigned. The proposed northeastern supply-monitoring well is not screened low enough to monitor the zone where Olin has assigned



the perchlorate detection. The same is also true to the southwest where well 10S03E13EH006 has a detection of 5.5 ppb, yet there are no wells farther to the Southwest that monitors that same interval. Olin shall submit a proposal for additional wells to be located to the northeast and southwest of the dedicated monitoring wells to characterize the lateral and vertical extent of perchlorate. This proposal shall be submitted by **May 27, 2005**.

The plume's leading edge:

The current proposal for the plume's leading edge is to monitor the plume with three supply wells. These wells are located in the zone that Olin has identified as the upper to middle B zone. Proposed well MW-50, appears to be constructed in the upper B zone and is the last well in the monitoring system. Well MW- 48 appears to monitor a deeper B zone and has had a 5.1 ppb detection. Well MW-48 detection has been assigned to the same interval as well Q10 (well designation taken from the Tennant Pacheco Fence Diagram), which has had a detection of 4.6 ppb. However, MW-48 appears to be screened across a lower zone which has also had perchlorate detections. Well MW-50 is not screened across the same lower interval as MW-48 and supply well driller log data is not available below MW-50. There appears to be a lack of vertical lithologic data near the plumes assumed southern extents. Regional Board staff believes it is appropriate to fully characterize the plumes southern extent based on the perchlorate detection in MW-50, the plume is continuing to migrate southward, there is a lack of indicator supply wells to the east of MW-50 so that the presence or absence of perchlorate cannot be adequately predicted. Regional Water Board staff believe that a minimum of three dedicated monitoring wells should be proposed for the plumes southern are in order to delineate extent of perchlorate in those areas.

2. Recommendations for locations of new monitoring wells or existing supply wells to act as sentry wells for the City of Gilroy and other high volume water users.

We have reviewed the proposed locations for sentry wells for the City of Gilroy and other significant water users. Regional Board staff is unable to determine if these wells are acceptable because of a lack of information related to the location and lithology of the Gilroy supply wells in relation to the sentry wells. Based on the information submitted the proposed sentry wells appear to be side gradient to the Gilroy supply wells. It appears that these sentry wells would not be appropriate sentry wells in and of themselves, based on the groundwater flow information on Figure 12 and the location of the Gilroy supply wells. In addition, other significant users are known to exist in the valley, Gilroy Foods, and no discussion was provided regarding those users. Therefore, additional work needs to be completed in order to demonstrate that the proposed monitoring wells are acceptable for use as sentry wells. This may include submittal of well logs for the Gilroy supply wells, fence diagrams showing lithology between the Gilroy supply wells and the proposed sentry wells, regional and local aquifer groundwater level maps, or other data that supports the use of the proposed sentry wells. The location of other significant water users also needs to be submitted to Regional Water Board staff so that the need for sentry wells can be evaluated.

3. ***Recommendations for and identification of water supply wells that are proposed for inclusion in the Llagas Subbasin Monitoring Plan. If the Dischargers choose to include water supply wells, those wells shall be shown to be equivalent to properly sited and constructed monitoring wells.***

Olin has proposed using 23 production wells to supplement the eight dedicated monitoring wells discussed above. Cleanup and Abatement Order R3-2005-0014 requires Olin to evaluate the 23 proposed supply wells to ensure they are equivalent to properly sited and constructed monitoring wells. Olin has chosen these wells based on existing construction information, driller logs, and the existence of existing perchlorate data. Olin intends to evaluate these wells in an ongoing manner, mainly by comparison of dedicated monitoring well and proposed supply well perchlorate monitoring results. Olin also believes they have secured long term access to most wells either in writing or because the owners have allowed over four quarters of sampling access.

Regional Water Board staff have reviewed the proposed wells and evaluation criteria. We are rejecting the proposed supply well evaluation criteria, mainly comparison of well perchlorate concentration results. The proposed evaluation criteria does not address the possibility that wells are producing diluted samples because of the combined effects of screen length, pump location and gravel pack length. In addition, the location of the dedicated monitoring wells is far enough away from the dedicated monitoring wells that it is unclear what a direct comparison of well results would demonstrate. A majority of the proposed supply monitoring wells are at the edges of the plume while most of the dedicated wells are assumed to be in the center. Direct comparison appears only to be relevant to wells MW-25 and 26 since they appear to be within the center of the plume and are close to one another (appears to be 1,000 feet, although less than 500 would be optimal for a comparison.) We believe that well evaluation criteria outlined in CAO R3-2005-0014 in combination with the criteria contained on Page 17 should be completed on the supply monitoring wells prior to submittal of the Llagas Subbasin Characterization Report. Proposed supply monitoring wells without lithologic or drilling log data are rejected unless additional characterization is completed. Regional Board staff is also concerned that the concentration evaluation process will not be completed prior to the submittal of the Llagas Subbasin Characterization Report. It is imperative that this work be completed so that the Llagas Subbasin Characterization is not unnecessary delayed or disputed by us or other interested parties.

In addition, written access agreements need to be provided for all private party wells so that long-term access is demonstrated. If written access cannot be secured, another supply well should be chosen (and evaluated according to the comments above) or a dedicated monitoring well shall be installed. The access agreements need to demonstrate that the well can be sampled for life of the monitoring program/cleanup.

4. ***Recommendations for a regional and local aquifer specific groundwater elevation-monitoring network to determine groundwater flow patterns***

It is unclear to Regional Water Board staff if the proposed supply monitoring wells have groundwater elevation ports that would allow groundwater level measurements. Regional Water Board staff is concerned about the ability of the proposed supply monitoring wells to accurately measure groundwater elevations in specific aquifer zones. Most of the supply wells have very



long gravel packs. These long gravel packs are likely to intercept other aquifer zones, which would cause error in aquifer specific measurements. The existence of monitoring ports on the proposed supply wells and the additional characterization in comment 3 needs to be verified and completed prior to Regional Board staff approving this groundwater level monitoring plan. Regional Board staff believes that the appropriate way to accurately measure groundwater elevations would be to compare the results of dedicated monitoring wells in the plumes center to dedicated wells at the plumes periphery. Regional Water Board staff would also like to know which wells may be fitted with transducers.

5. Recommendations for a sampling and analysis plan that establishes standard sampling procedures.

Item 4 on Page 20 conflicts with section 3.6.3.1 on page 19. Hours of sampling are different for groundwater elevation measurements on each of these pages.

While we do not have additional comments, Regional Board staff will be reviewing comments from other interested parties and will ask Olin to address those comments when necessary. We may also ask Olin to modify or update the Sampling and Analysis Plan on an as needed basis.

6. Recommendations for a statistical method to determine if perchlorate concentrations are increasing, decreasing or static. The statistical method shall be applied to all monitoring wells.

Please provide the computer program that utilizes the Mann-Kendall methodology for our review and acceptance.

7. Recommendations for prioritizing the investigation and characterization of plume areas to aid in the earliest possible determination of plume migration status.

While the recommendations in section 3.8, for prioritizing the investigation and characterization, are useful, it does not meet the full intent of CAO R3-2005-0014. The purpose of this section was for Olin to prioritize the installation of wells and other work to determine the plumes migration status. Regional Board staff believed that the areas that are especially threatened are those near the plumes southern extents (ie City of Gilroy wells and Gilroy Foods wells). Regional Board staff believe that it would be better to get the wells installed in these areas first, so that the evaluation process listed in section 3.8 could be utilized at the earliest possible time.

This concludes our initial comments on the Monitoring Plan. We may have additional comments for your to consider as our review proceeds and we receive other interested parties comments. Should you have any questions please let Eric or I know.

Thanks



If you have any questions, please contact **David Athey at (805) 542-4644** or Eric Gobler at (805) 549-3467.

Sincerely,

Roger W. Briggs
Executive Officer

cc via E-mail:

Olin Interested Party List

Ms. Lori Okun
Office of the Chief Counsel
State Water Resources Control Board

cc via U.S. Mail:

Mr. Jay Baksa
City of Gilroy
7351 Rosanna Street
Gilroy, CA 95020-6197

Ms. Helene Leichter
City of Morgan Hill
17555 Peak Avenue
Morgan Hill, CA 95037

Sedgwick, Detert, Moran &
Arnold
One Embarcadero, 16th Floor
San Francisco, CA 94111-
3628

Mr. Eric Lacy
CA Dept. of Health
Services
2151 Berkeley Way
Berkeley, CA 94704-1011

Mr. Eugene Leung
CA Dept. of Health Services
2151 Berkeley Way
Berkeley, CA 94704-1011

Mr. Joe Root, General
Manager
Corde Valle
One Corde Valle Club Drive
San Martin, CA 95046

Mr. Richard Peekema
4817 Wellington Park Dr.
San Jose, CA 95136

Ms. Suzanne Muzzio
Santa Clara Co. Env. Health
Services
1555 Berger Drive, Suite 300
San Jose, CA 95112-2716

Mr. Rob Stern
7510 Kenbrook Place
Suwanee, GA 30024

Mr. Keith M. Casto

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